QuickStart

User Manual

BR3410NI-A03-AC120

Plug-n-Play Servo System
with analog drive, brushed motor and cables
(Continuous 10 lb-in, 4200 rpm)

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

v. 1.02

ADVANCED

Thank you for purchasing this QuickStart package!
QuickStart makes it easy to set up Advanced Motion Controls drives to get your system running quickly. The drive and motor have been matched with each other, the cables are custom made for this system and an interface board simplifies integration with your controller.

Remember, if you need us, we are here for you!
Our goal is to get you up and running as quickly as possible. If at any point you have a question, a team of applications engineers and our customer service staff are just a phone call away. We are available weekdays from 8am to 5pm Pacific Time at **805-389-1935**. We can also be contacted via email through our website www.a-m-c.com - go to "Contact Us".

4 steps to success!

1	2	3	4
Getting Started What's included with QuickStart and what to expect.	**5-Minute QuickStart** Lets spin the motor!	**Integrate QuickStart into your System** Get your machine working.	**Going into Production** Transitioning from prototype to production.

This manual has been laid out in four sections to guide you through the process of setting up and integrating your QuickStart system. By following each step in succession you will first be introduced to QuickStart, then hook up the system for a simple bench test, and then integrate QuickStart into your machine and finally transition into the production stage.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

1
Getting Started

BR3410NI-A03-AC120

What to Expect

What is 'QuickStart'?
QuickStart is a system offering including: a drive, a motor, all necessary cables, and an interface board with screw terminal connections - all in one box ready for fast delivery!

What purpose does 'QuickStart' serve?
QuickStart is intended to introduce OEMs to Advanced Motion Controls servo drives and provide a positive first experience.

Why is Advanced Motion Controls offering a 'QuickStart' package?
We realize that many OEMs today are faced with trying to get their machinery to market using the fastest possible methods. Our solution is to provide a means by which motion control can be quickly proven.

How does 'QuickStart' benefit potential customers?
QuickStart is designed to make system prototyping easier to include Advanced Motion Controls' servo drives. The attraction to OEM's is a savings of time, money and the personnel needed to move from conception to production. Upon receipt, everything will plug in and operate within 5 minutes. All systems are initially configured in velocity or voltage mode to turn the motor shaft at 30 +/- 20 rpm. This is an indication that when put together, it works out of the box. No pots to tweak or software to configure!

Are the motors in the 'QuickStart' program available for individual resale?
Quite simply, not from Advanced Motion Controls. The motors in these packages are meant to represent what is commonly available from many different manufacturers. Your local Advanced Motion Controls representative can handle requests for motor model information for additional purchases.

How is 'QuickStart' pricing important to me?
Careful selection of systems incorporate popular Advanced Motion Control's drives in order to maximize exposure and minimize costs.

What other considerations should you know about 'QuickStart'?
Although it will be hard to find easy-to-configure systems like these at lower prices anywhere, QuickStart isn't intended for multiple, pre-packaged system selling. Initial exposure to Advanced Motion Controls' drives is the key. Each project will be followed up by our Sales department to determine overall progress and assist in determining the next step.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

1
Getting Started

Package Contents

☐ Brushed Servo Drive	30A20AC
☐ Brushed NEMA 34 Motor	MBR3410NI
☐ Screw Terminal Board	SIB (System Interface Board)
☐ Motor Power Cable (10 foot)	CBL-P03-10
☐ Drive Power Cable	CBL-AC-IEC
☐ Drive Cable (1.5 foot)	CBL-D01
☐ Documentation	Quick Connect Sheet
	User Manual
	Brochure with CD ROM

Additional Requirements

Item	Notes
Power Supply	**Requirements:** • **120VAC 60 Hz Single Phase** Acceptable Operating Range 30 – 125 VAC
Feedback	Since this package does not come with feedback, an additional encoder or tachometer must be installed for precise position or velocity control.
Controller	+/-10V command signal.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

2
5-Minute QuickStart

Let's spin the motor!

This quick setup procedure will get the motor moving in a short amount of time *without the need for a controller*. The drive has been pre-configured in **voltage mode** with a slight offset. This will turn the motor at a slow steady speed on power-up to demonstrate operation. Once the system is shown to be operational, the next section **Integrating QuickStart into your System** will guide you through the process of integrating the system into your application.

Wiring

On page 7 you will find the cables and connections sheet. Use this as a reference when following the steps in this section.

Drive

Connect cable CBL-D01 to the P1 connector on the drive. Connect the other end to the C2 connector on the system interface board (SIB).

Motor

Connect the white connector on the motor to the corresponding connector on cable CBL-P03-10. Connect the red and black wires to the P2 connector on the drive.

Black	Motor 1, P2-1
Red	Motor 2, P2-2

CBL-AC-IEC supplies AC to the drive. Do not apply power at this time. An AC power strip or other switch can be used to make cycling power more convenient during testing.

Grounding

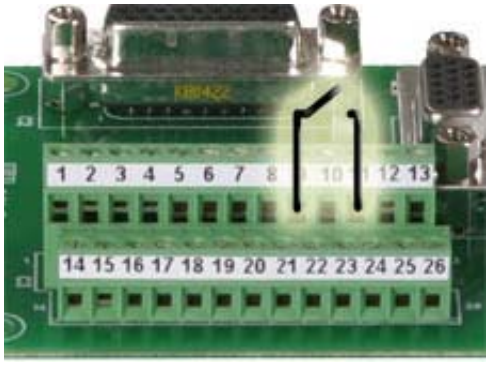
Bring all ground wires to a central point ground such as a ground bus, ground plane or a single ground bolt. Also don't forget to ground the drive chassis! Use the silver screw marked PE on the case.

Motor Ground – The green wire coming from motor power cable is the motor chassis ground. If the motor case is already grounded through direct contact with the machine housing, then leave the green wire disconnected. Grounding the motor at both the green wire and at the motor case causes a ground loop that has been shown to disrupt the feedback signals. Choose one or the other.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Inhibit Switch (optional for this section)

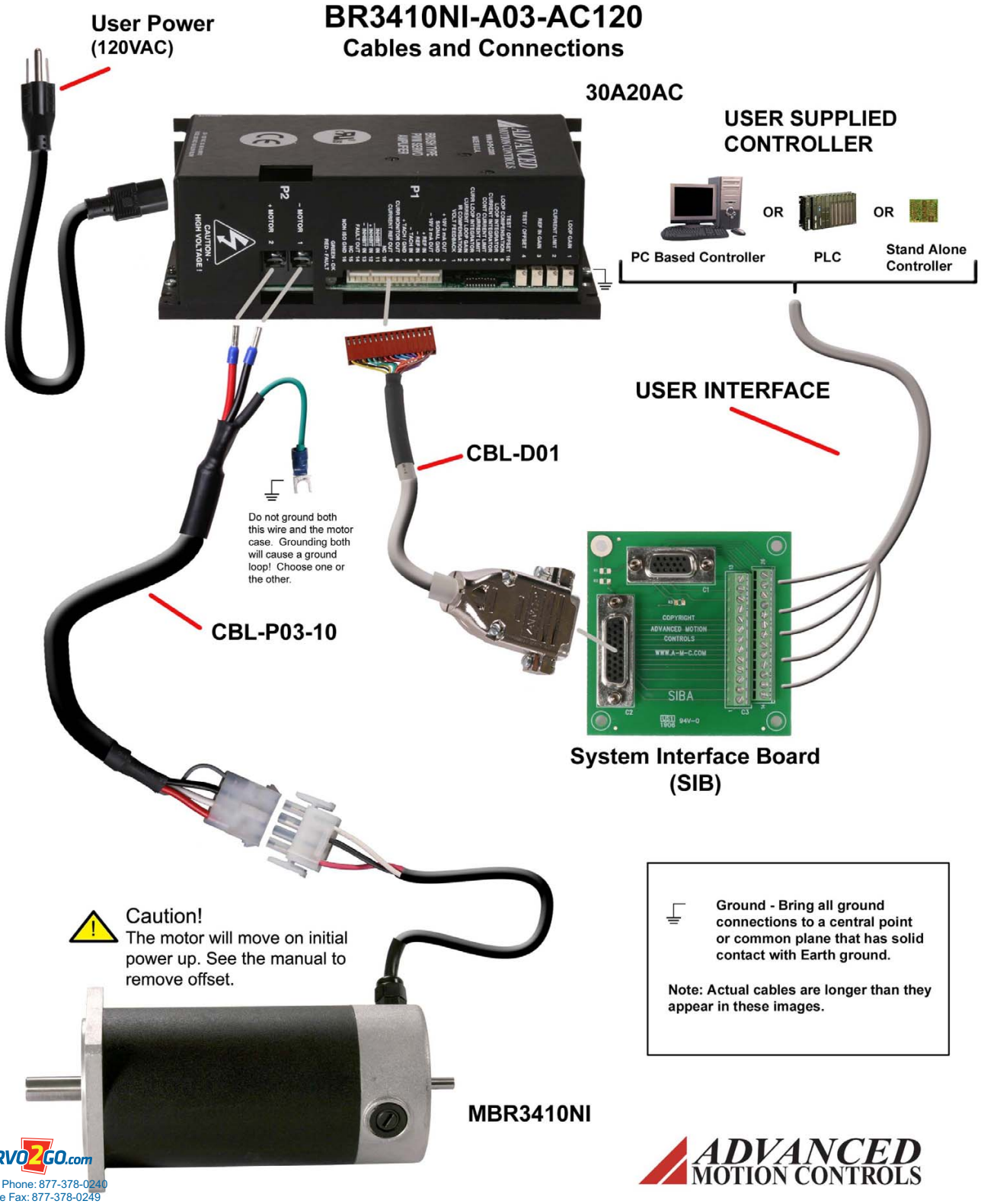
An inhibit switch (not included) can be connected between pins 9 and 11 on the Interface Board. This switch disables power to the motor until you are ready. Opening the switch Enables the drive, closing the switch Disables the drive.



Cautions

Unexpected motion – To avoid the motor from jumping unexpectedly and causing damage, the motor should be secured either with clamps or bolted down using its mounting holes.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com


BR3410NI-A03-AC120
Cables and Connections
User Power
(120VAC)
30A20AC
USER SUPPLIED
CONTROLLER
OR
OR
PC Based Controller
PLC
Stand Alone
Controller
USER INTERFACE
CBL-D01
Do not ground both this wire and the motor case. Grounding both will cause a ground loop! Choose one or the other.
CBL-P03-10
System Interface Board
(SIB)
Caution!
The motor will move on initial power up. See the manual to remove offset.
MBR3410NI
Ground - Bring all ground connections to a central point or common plane that has solid contact with Earth ground.
Note: Actual cables are longer than they appear in these images.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

ADVANCED MOTION CONTROLS

Inhibit Line Test (optional) – Follow this step only if you installed the inhibit switch described in the wiring section on page 6. This is to verify that the optional inhibit switch is functioning and the drive is initially powered up in a disabled state.

1. Disconnect the motor power by unplugging the white connector on CBL-P03-10. *Unplugging this connection allows you to power up the system without the possibility of spinning the motor.*
2. Apply power to the drive. Toggle the inhibit switch and verify that you can cause the LED color to change from Red to Green. Set the switch so the LED is Red.
3. Remove power from the drive and reconnect the white connector on CBL-P03-10.

System Power Up

1. Apply power to the drive. *If an inhibit switch has been installed, enable the drive by toggling the inhibit switch so the LED turns Green.*
2. The motor should turn at a controlled speed.
3. If the motor turns then the system has been hooked up correctly. Remove power and continue to the next section. If not then go to **Troubleshooting**.
4. To stop the motor from turning, turn the Test/Offset switch (SW10) to the OFF position. Then use the offset pot (Pot 4) to set the speed to zero.

Troubleshooting

LED not lit.	Verify that power has been applied to the drive.
Motor doesn't have holding torque	Verify that the LED is Green.
LED doesn't turn Green.	Verify all cables are connected. If an Inhibit Switch has been installed, toggle the Inhibit switch.
Motor doesn't turn but has holding torque	Turn Pot 4 (Test/Offset) in either direction. This will change the amount of offset in the drive.
Contact Factory - If you can't get the motor turning within a few minutes, please call and ask for technical support! 805-389-1935. We want to get you up and running quickly!	

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

3a Wiring
Integrate QuickStart into your System

The following instructions are a continuation of the **5-Minute QuickStart**. This section explains controller wiring, drive configuration, drive mounting, motor mounting, SIB mounting and load coupling.

Signal Ground

Almost all signals between the drive and the controller are referenced to signal ground. Without this reference, the drive and the controller would not be able to transmit signals to each other. To ensure that the signals between the drive and the controller are referenced to the same potential, the signal grounds on the controller and the drive must be connected together. This is especially important for:

- Single ended command signals
- Inhibit line
- Other inputs and outputs.

You will need to identify the signal ground on your controller and connect it to the signal ground on the drive. For your convenience, the Signal Ground is accessible at two locations on the SIB. However, to avoid ground loops there should only be one connection between the drive signal ground and the controller signal ground. Don't add a connection if there is already continuity between the two grounds.

Available Signal Ground Locations on the SIB

Controller	SIB
Signal Ground	C3-2 (SGND)
	C3-7 (Tach/GND)

Command Signal

Command signal and mode selection are dictated by the capabilities of your controller and the desired operation of your system. Analog +/- 10V command signals are suited for torque and velocity modes

+/-10V Command Signal (Single Ended)

Signal	SIB	Available Drive Modes
SGND	C3-2 (SGND)	Torque Mode, Velocity Mode
Command	C3-4 (Ref+)	

+/-10V Command Signal (Differential)

Signal	SIB	Available Drive Modes
Command +	C3-4 (Ref+)	Torque Mode, Velocity Mode
Command -	C3-5 (Ref-)	

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

More Information on Mode Selection

Drive modes can be separated into three basic categories: Torque, Velocity and Position. The name of the mode describes what servo loops are being closed in the drive. They don't describe the end-result of the operation. For example, a drive in Torque mode can still be

in a positioning application if the external controller closes the position loop. In fact, most high performance positioning systems use a drive in torque mode with the controller closing the velocity and position loops.

The correct mode is determined by the requirements of the controller. Some controllers require that the drive be in torque mode. Other controllers require that the drive be in velocity mode. Check the documentation on your controller or contact the manufacturer of your controller to determine the correct mode for your drive.

Once the command signal and mode have been selected, connect the controller to the signals as indicated in the above tables. The proper gains and command settings must also be configured. This will be explained later in the configuration section.

Drive Inhibit (recommended)

The inhibit line is used to turn off power to the motor while the drive is still powered on. Sometimes this is necessary if power to the motor needs to be removed quickly or if the user needs to manually move the load in a freewheeling condition. If your controller has an inhibit function then we highly recommend that you use it.

Inhibit Connection

Controller	SIB
Inhibit	C3-11 Inhibit

Note: The inhibit input is configured to disable the drive when pulled low (active low).

Drive Mounting

Mounting Dimensions can be found in the drive datasheet in the Appendix.

The drive can be mounted flat against the base plate or along the spine.

Mounting the drive flat on the base plate against a large thermally conductive surface for cooling will provide the most natural heat dissipation for the drive. A metal back plane in a cabinet on the machine often makes a good surface.

Drives mounted on the spine can be mounted next to each other. Maintain a minimum separation of 1 inch between drives to provide adequate convection cooling.

Note: Additional cooling may be necessary to dissipate the heat generated by the drive depending on ambient temperatures, duty cycle and natural ventilation.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Motor Mounting

Mounting Dimensions can be found in the motor datasheet in the Appendix.

The mounting surface must be stiff enough so it does not deflect when radial loads are applied to the motor shaft. The mounting surface should also have good thermal conductivity, especially if peak performance is demanded of the motor.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

3a Wiring
Integrate QuickStart into your System

SIB Mounting
Mounting Dimensions can be found in the SIB datasheet in the Appendix.

The SIB can be mounted using the mounting holes or a DIN tray such as from Phoenix Contact. If using the mounting holes, standoffs must be used to keep the bottom of the SIB from shorting with the mounting surface.

Cable Routing
Cable Datasheets can be found in the Appendix.

QuickStart cables come with excellent shielding and make proper grounding easy. This makes proper cable routing less critical, however proper routing practices should still be followed.

Route cables to minimize length and minimize exposure to noise sources. The motor power wires are a major source of noise and the motor feedback wires are susceptible to receiving noise. This is why it is never a good practice to route the motor power wires close to the motor feedback wires even if they are shielded. Although both of these cables originate at the amplifier and terminate at the motor, try to find separate paths that maintain distance between the two. A rule of thumb for the minimum distance between these wires is 1cm for every 1m of cable length.

Grounding
Bring all ground wires to a central point ground such as a ground bus, ground plane or a single ground bolt. Also don't forget to ground the drive chasis! Use the silver screw marked PE on the case.

Motor Ground – The green wire coming from CBL-P03-10 is for the motor case ground. If the motor case is already grounded through direct contact with the machine housing, then leave the green wire disconnected. Grounding the motor at both the green wire and at the motor case causes a ground loop that has been shown to disrupt the encoder signals. Choose one or the other.

Load Coupling
A non-rigid coupling must be used between the motor shaft and the load to minimize mechanical stress due to radial loads, axial loads or misalignment. If you feel that the radial load on the motor is excessive, you may want to consider connecting the motor to an idler shaft that is supported by pillow block bearings (or similar). Then the load can be coupled to the idler shaft without risking damage to the motor bearings.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Configuration

30A20AC Capabilities

Mode Category	Mode Name
Torque	Current
Velocity Estimation	Voltage*
	IR Compensation

***** Voltage Mode and IR Compensation Mode do not use direct feedback to close the velocity loop; therefore, they can't be considered true velocity modes. These modes produce velocity that is roughly proportional to the input command but are not as precise as using a Tachometer or Encoder.

The correct mode is determined by the requirements of the controller. Some controllers require that the drive be in torque mode. Other controllers require that the drive be in velocity mode. Check the documentation on your controller or contact the manufacturer of your controller to determine the correct mode for your drive.

Advanced Motion Controls Analog Servo Drives are configured using Switches and Potentiometers. There is no software to download or configure.

The basic setup of these servo drives is straight forward and user friendly. These instructions will walk you through the steps necessary to configure your drive to your system:

- Configure the drive mode.
  - Torque Mode (page 14)
  - Velocity Mode (page 15)
    - Voltage
    - IR Compensation

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Torque Mode Configuration

The terms 'Torque Mode' and 'Current Mode' are synonymous. They can be interchanged and you may see either of these terms throughout this document and other motion control documents.

The Switches and Potentiometers set the mode on the drive. Use the Mode Selection Table for the correct configuration.

Mode Selection Table – Torque Mode

Switches	**SW1**	Off
	SW2	Off
	SW3	On
	SW4	Off
	SW5	On
	SW6	On
	SW7	Off
	SW8	On
	SW9	Off
	SW10	Off
Pots *	**Pot1** Loop Gain	Full CCW
	Pot2 Current Limit	Full CW
	Pot3 Reference Gain	Full CW
	Pot4 Offset	Mid (7 turns)

Current Limit with these settings – 7.5A continuous, 30A peak

** Potentiometer Instructions* – CW is the clockwise direction, CCW is the counterclockwise direction. Full CW or Full CCW means the pot has been turned to the end of its travel where it begins to click on every turn. These potentiometers have a 14 turn range before they start to click.

The number of potentiometer turns on the Mode Selection Table is referenced from the full counterclockwise position. To maintain consistency in the number of turns the initial starting point is defined as follows:

1. Turn the pot CCW until the pot begins to click on every turn.
2. Continue to slowly turn the pot CCW until the next click is heard, then stop.
3. Now turn the pot in the CW direction the number of turns indicated in the Mode Selection Table.

Gain Setting

The gain of the drive (amps out)/(volts in) can be adjusted using the Reference Gain Potentiometer, Pot 3. Turning the pot to the full clockwise position results in a gain of roughly 3A/V. Turning the pot counter clockwise reduces the gain down to a minimum of

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Velocity Mode Configuration

Velocity mode controls the motor such that the motor velocity is proportional to the input command. The gain can be expressed as (output velocity)/(input command). Common units are (rpm)/(V) and (counts per second)/(V).

Since the two velocity modes in this system don't use direct feedback, their performance isn't as accurate as a true velocity mode.

Voltage Mode
This mode does not use any feedback to determine velocity. Velocity is estimated by measuring the voltage across the motor terminals. Since motor voltage is proportional to the speed, the velocity can be controlled.

IR Compensation Mode
This is the same as Voltage Mode with the addition of positive current feedback into the voltage loop. IR compensation improves on Voltage Mode performance by enabling the amplifier to react to disturbances on the motor shaft. When the shaft is stalled, the back emf naturally drops which increases the current into the motor. The increased current (in the form of a voltage signal) is injected back into the voltage loop, which effectively tells the motor to further increase the output and maintain velocity. The disadvantage of this mode is the use of positive feedback that tends to make this mode more unstable and difficult to tune.

The Switches and Potentiometers set the mode on the drive. Use the Mode Selection Table for the correct configuration.

Mode Selection Table

		Voltage	IR Comp
Switches	**SW1**	On	On
	SW2	Off	On
	SW3	On	On
	SW4	Off	Off
	SW5	On	On
	SW6	Off	Off
	SW7	Off	Off
	SW8	Off	Off
	SW9	Off	Off
	SW10	Off	Off
Pots *	**Pot1** Loop Gain	10.5 turns	10.5 turns
	Pot2 Current Limit	Full CW	Full CW
	Pot3 Reference Gain	Full CW	Full CW
	Pot4 Offset	Mid (7 turns)	Mid (7 turns)

Current Limit with these settings – 7.5A continuous, 30A peak

* *Potentiometer Instructions* – CW is the clockwise direction, CCW is the counterclockwise direction. Full CW or Full CCW means the pot has been turned to the end of its travel where it begins to click on every turn. These potentiometers have a 14 turn range before they start to click.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

3b Configuration (Velocity Mode)
Integrate QuickStart into your System

The number of potentiometer turns on the Mode Selection Table is referenced from the full counterclockwise position. To maintain consistency in the number of turns the initial starting point is defined as follows:

1. Turn the pot CCW until the pot begins to click on every turn.
2. Continue to slowly turn the pot CCW until the next click is heard, then stop.
3. Now turn the pot in the CW direction the number of turns indicated in the Mode Selection Table.

Loop Gain

Pot 1

In Velocity Mode the loop gain increases the responsiveness of the system. The loop gain settings in the mode selection table are a good starting point. However, once the drive is in the system, the loop gain will need to be adjusted to match the system dynamics.

To adjust the Loop Gain

- Turn the Loop Gain pot to the full counterclockwise position.
- Enable the drive
- Turn the Loop Gain pot clockwise.
- When the system begins to make a loud buzzing noise, turn the pot in the counterclockwise direction until the buzzing stops.
- Turn the pot one more turn in the counter clockwise position.

Reference Gain

Pot 3

The gain of the drive (velocity out)/(volts in) can be adjusted using the Reference Gain Potentiometer, Pot 3. Turning the pot clockwise increases the gain, while turning the pot counter clockwise decreases the gain.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

4
Going into Production

Prototype to Production

Once you have completed your proof of concept you will be ready to design for production. If you decide that the QuickStart drive and motor are perfect for you then you're in luck. Both are popular off-the-shelf items that are readily available. Drives can be ordered directly from us and we can put you in touch with the appropriate motor supplier.

If your servo system requires a drive that better fits your application such as:

- Additional features
- Different power range
- Smaller size
- Different form factor such as 'plug in' style drives
- Network connectivity

Then our applications engineers can help optimize your system by selecting the best drive for your needs.

You will also be in contact with a local representative to help you with the selection of motors and other system components such as cables, gear boxes, slides, bearings and more.

Feedback

Your feedback is important to us. Your comments can make QuickStart better and help us improve our processes, technical support, customer support and product offering. Please go to www.a-m-c.com/feedback.html

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Sold & Serviced By:

SERVO2GO.com

Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Appendix

A. System Specifications

B. Drive

C. Motor

D. Cables

E. System Interface Board

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

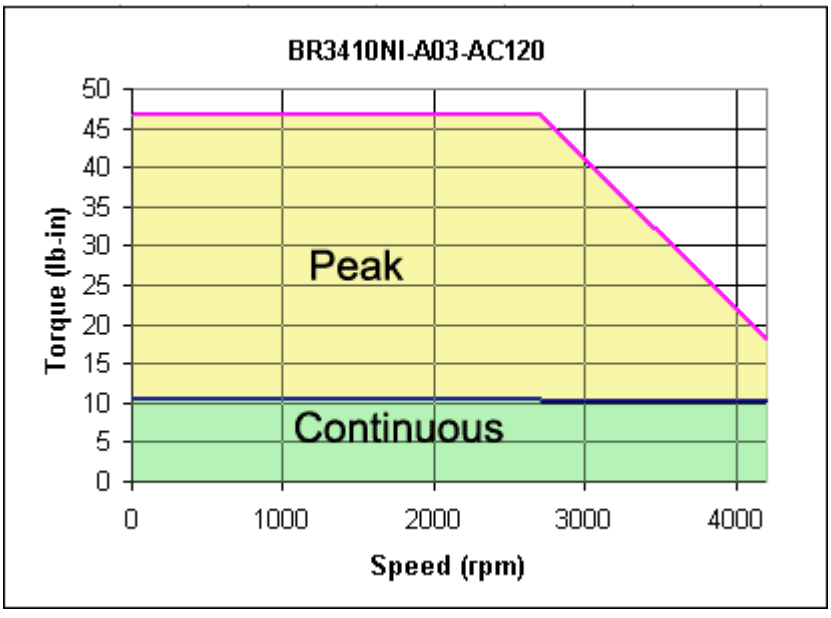
Sold & Serviced By:

SERVO2GO.com

Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

System Specifications

System Specifications

Torque – peak	46.8 lb-in, 5.27 Nm
Torque – continuous	10.6 lb-in, 1.2 Nm
Velocity Maximum	4200 rpm
Supply Voltage	120VAC
Encoder Resolution	NA – this package does not come with an encoder
Speed Torque Curve	

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Sold & Serviced By:

SERVO2GO.com

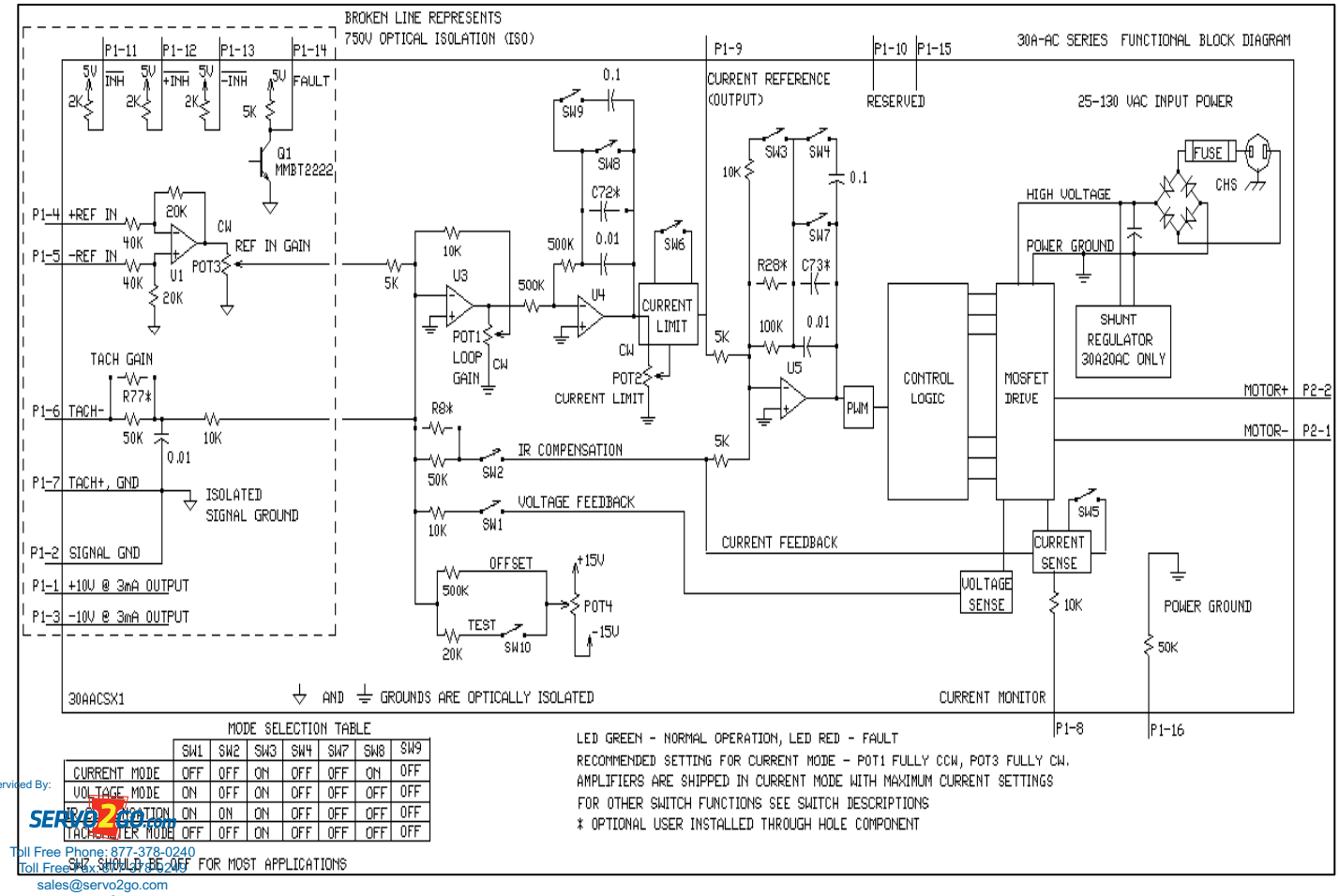
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

SERIES 30A-AC SERVO AMPLIFIERS
Models: 30A20AC, 16A20AC
120VAC, 50-60 Hz Single Supply Operation

FEATURES:

- Surface-mount technology
- Small size, low cost, ease of use
- Built-in optical isolation, see block diagram
- Shunt regulator (30A20AC only)
- DIP switch selectable: current, voltage, velocity, IR compensation, analog position loop
- Four quadrant regenerative operation
- Agency Approvals:

BLOCK DIAGRAM:



	SW1	SW2	SW3	SW4	SW7	SW8	SW9
CURRENT MODE	OFF	OFF	ON	OFF	OFF	ON	OFF
VOLTAGE MODE	ON	OFF	ON	OFF	OFF	OFF	OFF
IR COMPENSATION	ON	ON	ON	OFF	OFF	OFF	OFF
TACHometer MODE	OFF	OFF	ON	OFF	OFF	OFF	OFF

SW SHOULD BE OFF FOR MOST APPLICATIONS

Sold & Serviced By:
SERVO2GO.COM
Toll Free Phone: 877-378-0240
Toll Free Fax: 866-658-6240
sales@servo2go.com
www.servo2go.com

DESCRIPTION: The 30A-AC Series PWM servo amplifiers are designed to drive brush type DC motors at a high switching frequency. A single red/green LED indicates operating status. All models are fully protected against over-voltage, over-current, over-heating and short-circuits across motor, ground and power leads. These models interface with digital controllers or can be used as a stand-alone system. They require only a single AC power supply. Loop gain, current limit, input gain and offset can be adjusted using 14-turn potentiometers. The offset adjusting potentiometer can also be used as an on-board input signal for testing purposes when SW10 (DIP switch) is ON.

	MODELS	
POWER STAGE SPECIFICATIONS	**30A20AC**	**16A20AC**
SINGLE PHASE AC SUPPLY VOLTAGE *	30 – 125 VAC @ 50 - 60 Hz	
PEAK CURRENT (2 sec. Max., internally limited)	± 30 A	± 16 A
MAXIMUM CONTINUOUS CURRENT (internally limited)	± 15 A	± 8 A
MINIMUM LOAD INDUCTANCE**	250 µH	250 µH
SWITCHING FREQUENCY	22 kHz ± 15%	
HEATSINK (BASE) TEMPERATURE RANGE	0° to +65° C, disables if > 65° C	
POWER DISSIPATION AT CONTINUOUS CURRENT	150 W	80 W
OVER-VOLTAGE SHUT-DOWN (self-reset)	195 VDC	
BANDWIDTH (load dependent)	2.5 kHz	
SHUNT RESISTOR (30A20AC)	10 Ω @ 50 W	N/A
SHUNT REGULATOR TRIP VOLTAGE (30A20AC)	185 V = On,180 V = Off	N/A
BUS CAPACITANCE	3600 µF	
SHUNT FUSE (d = .25 inches, L = 1.25 inches)	3 A, 250 VAC Motor Delay	N/A
BUS FUSE (5 X 20 mm)	15 A slow-blow rated @ 250 VAC	

MECHANICAL SPECIFICATIONS	
POWER CONNECTOR	Screw terminals
SIGNAL CONNECTOR	Molex connector
SIZE	7.35 x 4.23 x 2.45 inches 186.7 x 107.4 x 62.2 mm
WEIGHT	2.5 lb. 1.14 kg

* Do not exceed 125 VAC input.
**Low inductance motors ("pancake" and "basket-wound") require external inductors.

These amplifiers contain a rectifier bridge and filter capacitors to generate the DC bus internally from the AC input power. The DC bus voltage is 1.4 times AC voltage (RMS), e.g. 170 VDC from 120 VAC. During braking much of the stored mechanical energy is fed back into the power supply and charges the output capacitor to a higher voltage. If the charge reaches the amplifier's over-voltage shutdown point, output current and braking will cease. To ensure smooth braking of large inertial loads a built-in shunt regulator is provided in model 30A20AC. The shunt regulator will switch on the internal power resistor when the bus voltage reaches 185 VDC. This resistor then dissipates the extra energy of the DC bus.

Sold & Serviced By:
SERVO 2 GO
Toll Free Fax: 877-378-0249
sales@servo2go.com

PIN FUNCTIONS:

CONNECTOR	PIN	NAME	DESCRIPTION / NOTES	I/O
P1	1	+10V OUT	Outputs regulated voltages of ±10 V @ 3 mA for customer use. Short circuit protected. Pin P1-2 is signal ground.	O
	2	SIGNAL GND		SGND
	3	-10V OUT		O
	4	+REF IN	Differential analog input, maximum ±15 V, 40K input resistance.	I
	5	-REF IN		
	6	-TACH IN	Maximum ±60 VDC, 60K input resistance.	I
	7	+TACH (SGND)		
	8	CURRENT MONITOR OUT	This signal is proportional to the actual current in the motor leads. Scaling is 4A/V (2A/V when SW5 = OFF) for 16A20AC; and 8A/V (4A/V when SW5 = OFF) for 30A20AC. See current limit adjustment information below. Referenced to P1-16.	O
	9	CURRENT REFERENCE OUT	Command signal to the internal current-loop. The maximum peak current rating of the amplifier always equals 7.25V. See current limit adjustment information below. Referenced to P1-16.	O
	10	Reserved		
	11	INHIBIT	This TTL level input signal turns off all four power devices of the "H" bridge drive when pulled to ground. This inhibit will cause a FAULT condition and a red LED. For inverted inhibit inputs; see section "G".	I
	12	+INHIBIT	Disables the amplifier for the "+" direction only. This inhibit will not cause a FAULT condition or a red LED.	I
	13	-INHIBIT	Disables the amplifier for the "-" direction only. This inhibit will not cause a FAULT condition or a red LED.	I
	14	FAULT OUT (red LED)	TTL compatible output. It becomes high during output short-circuit, over-voltage, over-heating, inhibit, and during "power-on reset". Fault condition indicated by a red LED.	O
	15	Reserved		
	16	NON-ISO GND	Connected to power ground and can be used as ground with P1-8 and P1-9.	PGND

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

SWITCH FUNCTIONS:

SWITCH	FUNCTION DESCRIPTION	SETTING	
		ON	OFF
1	Internal voltage feedback	On	Off
2	Internal current feedback for IR compensation	On	Off
3	Current loop gain	Decrease	Increase
4	Current loop integration	Increase	Decrease
5	Current scaling. When OFF, increases sensitivity of current sense thus reducing both peak and continuous current limit by 50%.	Full-current	Half-current
6	Can be used to reduce factory-preset maximum current limit.	Cont./Peak Ratio 25%	Cont./Peak Ratio 50%
7	It is recommended to leave SW7 in the OFF position.	Shorts out the current loop integrator capacitor	Current loop integrator operating
8	This capacitor normally ensures "error-free" operation by reducing the error-signal (output of summing amplifier) to zero.	Shorts out the outer velocity / voltage loop integrator capacitor.	Velocity/ Voltage integrator operating.
9	Adjusts the value of the integrator capacitor. It is recommended to leave SW9 in the OFF position for most applications.	Increase	Decrease
10	Offset / test. Controls sensitivity of the "offset" pot. Used as an on-board reference signal in test mode.	Test	Offset

POTENTIOMETER FUNCTIONS:

POTENTIOMETER	DESCRIPTION	TURNING CW
Pot 1	Loop gain adjustment in voltage & velocity modes. Turn this pot fully ccw in current mode.	Increases loop gain
Pot 2	Current limit. It adjusts both continuous and peak current limit by maintaining their ratio (50%).	Increases current limit
Pot 3	Reference gain. It adjusts the ratio between input signal and output variables (voltage, current, and velocity).	Increases reference input gain
Pot 4	Offset / test. Used to adjust any imbalance in the input signal or in the amplifier. When SW10 (DIP switch) is ON, the sensitivity of this pot is greatly increased thus it can be used as an on-board signal source for testing purposes. See section "G".	N/A

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

TEST POINTS FOR POTENTIOMETERS: See section "G"

SET-UP: See section “G” for engineering and installation notes.

STANDARD INPUT SIGNAL ISOLATION:

These amplifiers feature an internally installed analog isolation amplifier, which optically isolates the inputs from the rest of the amplifier circuitry. See functional block diagram above.

OPERATING MODE SELECTION:

These modes can be selected by the DIP switches according to the chart in the functional block diagram:

- Current Mode
- Voltage Mode
- IR Compensation Mode
- Tachometer Mode

See section "G" for more information.

APPLICATION NOTE:

See section “G” for more information on analog position loop mode.

CURRENT LIMIT ADJUSTMENTS:

These amplifiers feature separate peak and continuous current limit adjustments.

The current limit adjusting Pot 2 adjusts both peak and continuous current limit at the same time. It has 12 active turns plus 1 inactive turn at each end and is approximately linear. Thus, to adjust the current limit, turn the potentiometer fully counter-clockwise, then turn clockwise to the appropriate value. If the desired limit is, for example, 15 amperes, and the servo amplifier peak current is 30 amperes, turn the potentiometer 7 turns clockwise from the fully counter-clockwise position.

Pin P1-9 is the input to the internal current amplifier stage. Since the output current is proportional to P1-9, the adjusted current limit can easily be observed at this pin. Note that a command signal must be applied to the reference inputs to obtain a reading on P1-9. The maximum peak current value equals 7.25V at this pin and the maximum continuous current value equals 3.63 V at this pin. If SW5=ON, peak rated amplifier current=7.25 V. if SW5=OFF, 1/2 peak rated amplifier current =7.25 V. Example: using the 30A20AC with SW5=ON, 30A=7.25 V and with SW5=OFF, 15A=7.25 V.

The actual current can be monitored at pin P1-8.

SW6 (DIP switch) will reduce the continuous current limit to 50% of the maximum value, when switched ON. SW5 (DIP switch) will reduce the current feedback (monitor) scaling by 50% thereby reducing both the peak and the continuous current limit by 50%, when switched OFF.

Sold & Serviced By:
SERVO2GO
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

TYPICAL SYSTEM WIRING: See section "G".

ORDERING INFORMATION:

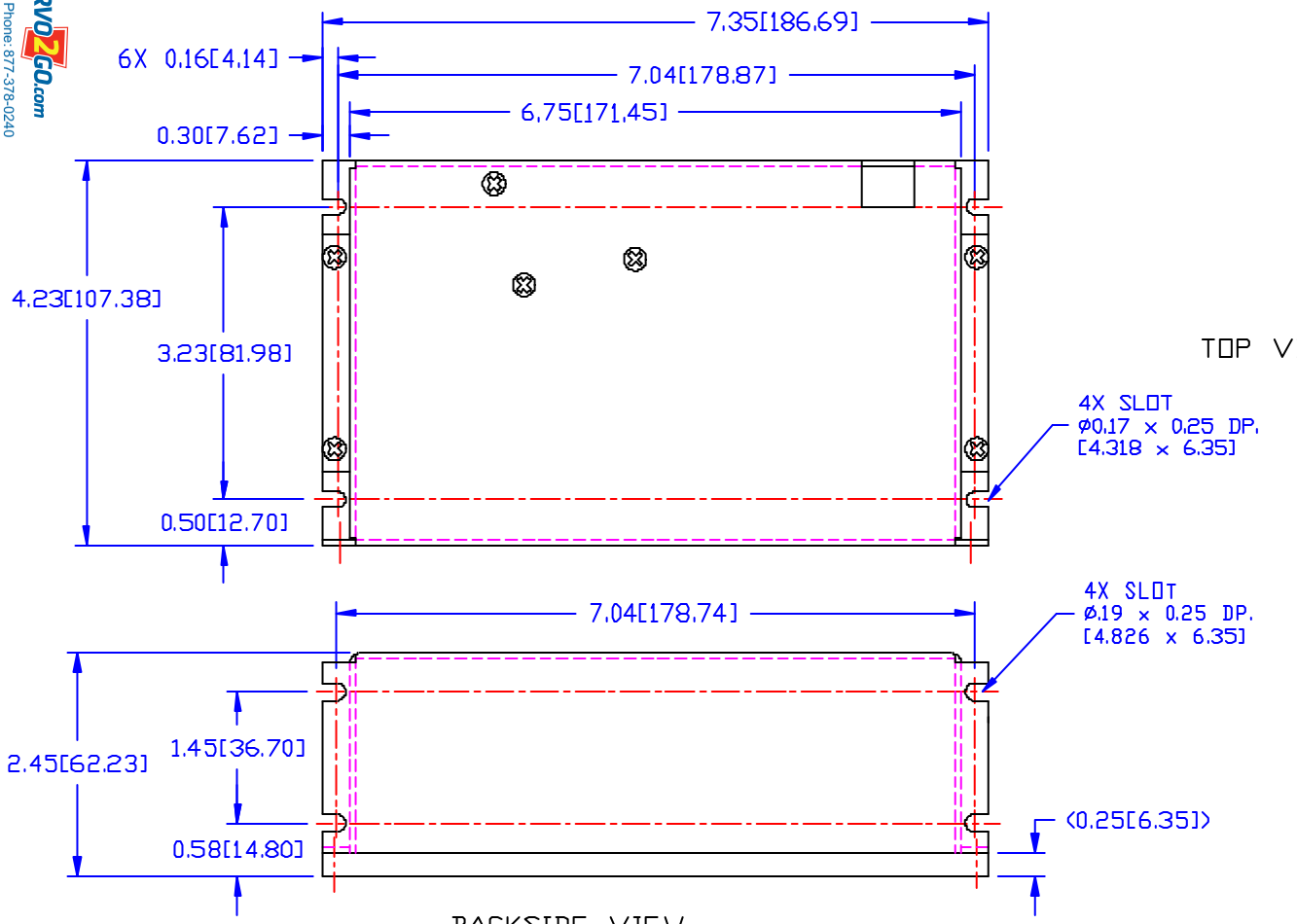
Models: 16A20ACX, 30A20ACX

X indicates the current revision letter.

MOUNTING DIMENSIONS: See page F-11.

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com



REV	DESCRIPTION	DATE	BY
B	ADD BX25A20AC TO USED ON COLUMN	01/25/02	RB
A	UPDATE DWG. FORMAT & PICTORIAL	08/22/96	RB

USED ON
BX25A20AC SERIES
BE25A20AC SERIES
B25A20AC SERIES
BD25A-AC SERIES
30A-AC SERIES

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES
.XX ± .010
.XXX ± .005
DO NOT SCALE DRAWING

DRAWN BY: R. BAUTISTA
DATE: 10/06/95
CHECK BY:
DATE:
DESIGN APPROVED:
DATE:

ADVANCED MOTION CONTROLS
• PWM SERVO AMPLIFIERS •
3805 Calle Tecate, Camarillo, CA 93012

TITLE: MOUNTING DIMENSIONS
B25A-AC & 30A-AC SERIES

SIZE: B
DWG. NO.: MB25AAC
REV: B
SCALE: NONE
SHT. 1 OF 1

NOTE: DIMENSIONS IN [ ] ARE IN MM.

Sold & Serviced By:

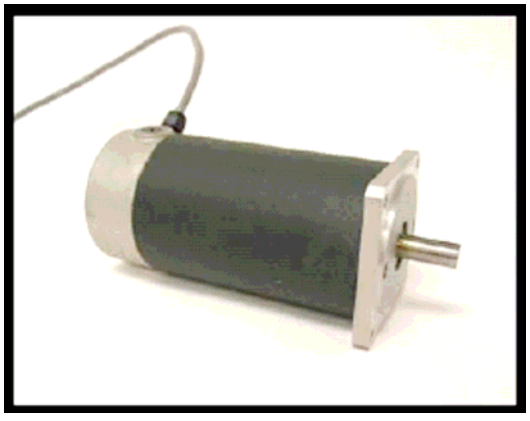
SERVO2GO.com

Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

MBR3410NI BRUSHLESS SERVO MOTOR

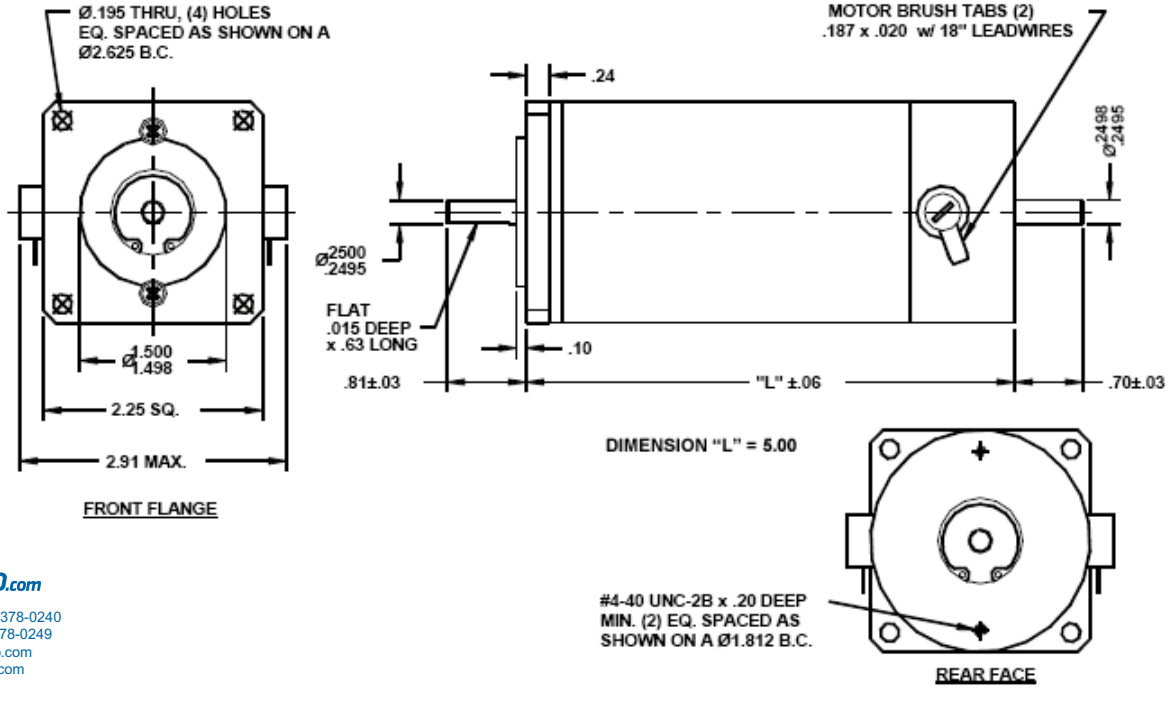
FEATURES:

- 3.25 Inch HD NEMA 34 Motor
- Continuous Torques up to 10.6 lb -in
- Speeds up to 4200 rpm
- Voltage Rating up to 90 Vdc
- 30 Lb Radial Load 1/2" from Front Face
- Smooth, low cogging Magnetics



SPECIFICATIONS:

SPECIFICATIONS	UNITS	VALUE
CONTINUOUS TORQUE	Nm (lb-in)	1.2 (10.6)
PEAK TORQUE	Nm (lb -in)	6 (53.1)
SPEED @ RATED VOLTAGE	RPM	4200
RATED VOLTAGE	V dc	90
CONTINUOUS CURRENT	A	7.6
PEAK CURRENT	A	38.0
TORQUE CONSTANT	Nm / A (lb -in / A)	0.1757 (1.56)
VOLTAGE CONSTANT	V / KRPM	18.4
RESISTANCE	ohms	0.68
INDUCTNACE	mH	2.35
INERTIA	kg-cm² (lb -in-s²)	3.39 (0.003)
WEIGHT	Kg (lb)	3.99 (8.8)



Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Sold & Serviced By:

SERVO2GO.com

Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

CBL-D01 DRIVE CABLE

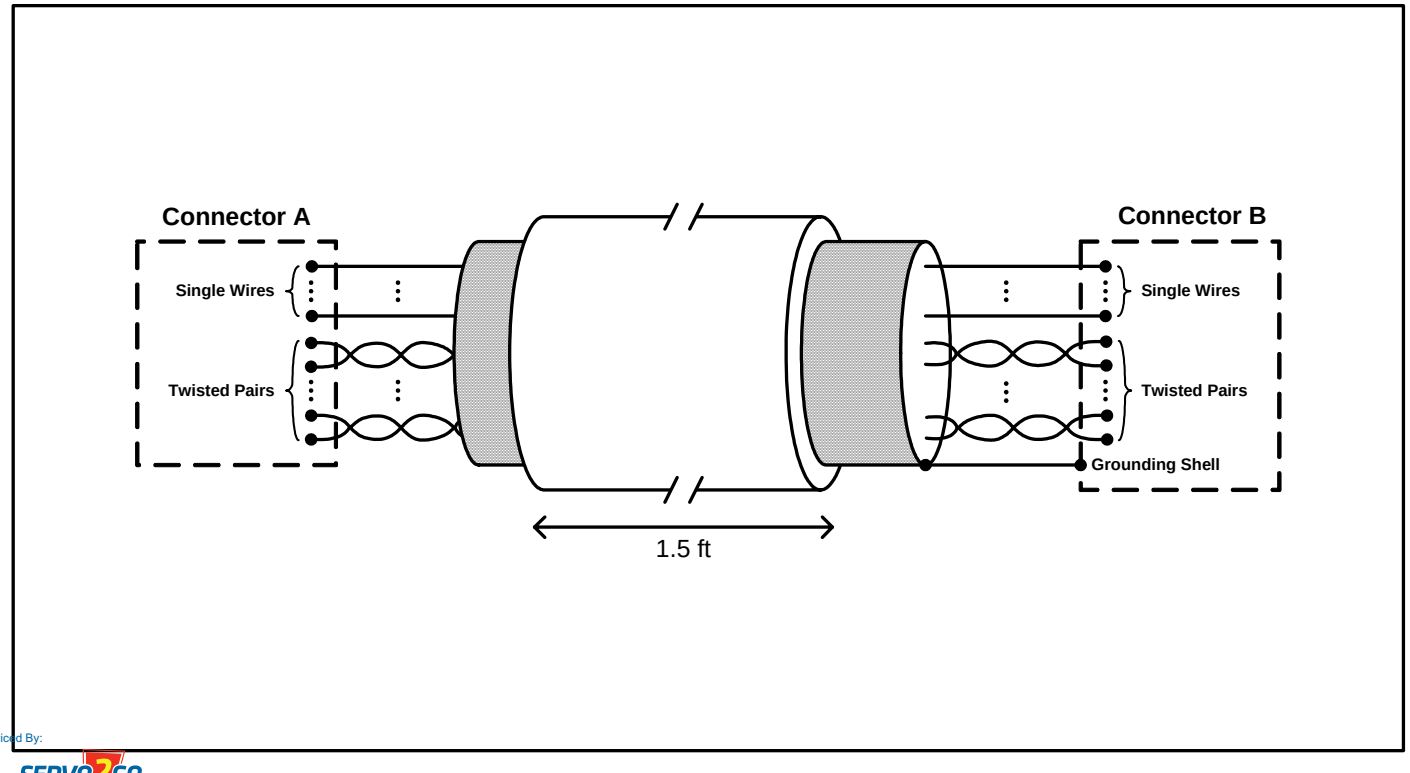
WIRING SPECIFICATIONS:

CABLE: CBL-D01						
Side 1		**Common**			**Side 2**	
Connector	**Contact**	**Wiring Scheme**	**Function**	**Wire Color**	**Contact**	**Connector**
A **16-Pin Molex** Connector: P/N 22-01-3167 Terminals: P/N 08-50-0114	2	Single Wire	SGND	black	2	**B** **26-Pin AMP (D-SUB)** Plug: P/N 748365-1 Housing: P/N 748677-2 Terminals: P/N 748333-4
	6	Single Wire	-TACH IN	black/white	6	
	7	Single Wire	+TACH	red	7	
	8	Single Wire	Current Monitor	red/black	8	
	9	Single Wire	(Variable)	blue	9	
	10	Single Wire*	(Variable)	blue/white	10	
	11	Single Wire*	(Variable)	purple	11	
	12	Single Wire	(Variable)	purple/white	12	
	13	Single Wire	(Variable)	orange	13	
	14	Single Wire	(Variable)	orange/white	14	
	15	Single Wire	(Variable)	brown	15	
	16	Single Wire	(Variable)	brown/white	16	
	1	Twisted Pair	+REF OUT	yellow	1	
	3		-REF OUT	yellow/black	3	
	4	Twisted Pair	+REF IN	green	4	
	5		-REF IN	green/white	5	
	-	Shield	Shield	-	Shell	

NOTE: For cables with only twisted pairs, single wires can be paired with other single or unused wires.

* Creating a twisted pair from these two wires is recommended for brushless applications.

DIAGRAM:



Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Sold & Serviced By:

SERVO2GO.com

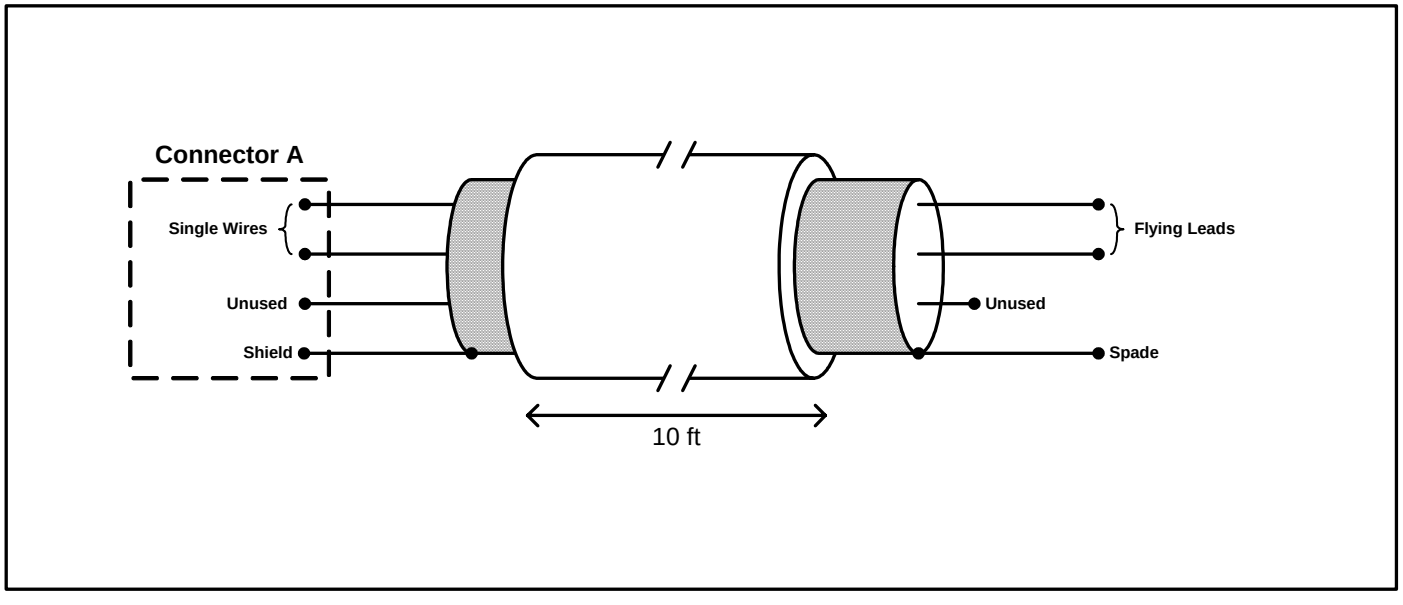
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

CBL-P03-10 POWER CABLE

WIRING SPECIFICATIONS:

CABLE: CBL-P03-10						
Side 1		Common			Side 2	
Connector	Contact	Wiring Scheme	Function	Wire Color	Contact	Connector
A (4-Pin AMP) Connector, Terminals: P/N 1-480703-0, P/N 350873-1	1	Single Wire	Motor +	red	Crimp	-
	2	Unused	-	white	-	
	3	Single Wire	Motor -	black	Crimp	
	4	Shield	Shield	grey	Spade	

DIAGRAM:



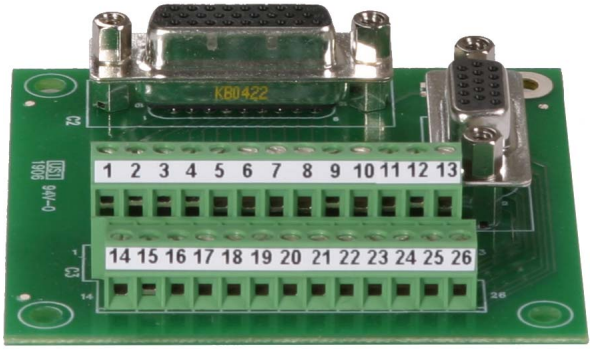
Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

Sold & Serviced By:

SERVO2GO.com

Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com

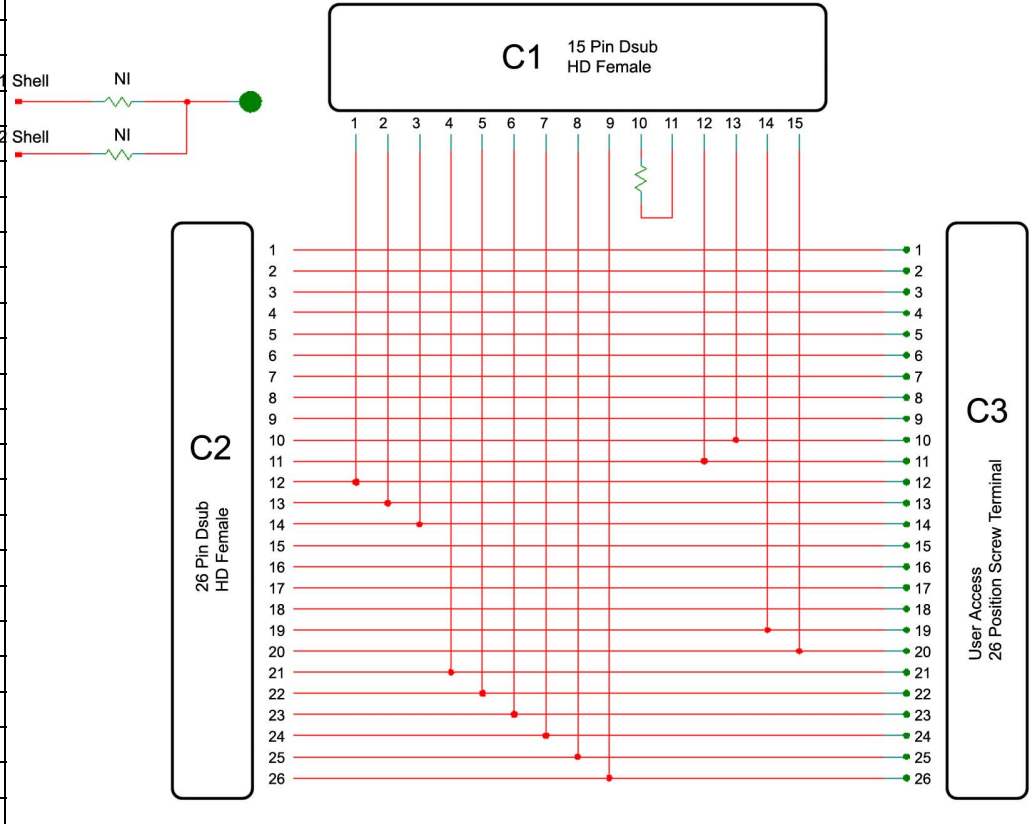
System Interface Board (SIB)



Dimensions	72mm x 72mm
C1 Connector	15 pin to motor
C2 Connector	26 pin to drive
C3 Connector	26 pin user interface.

C3 Pin Functions

Pin	Function
1	+10V 3mA
2	SGND
3	-10V 3mA
4	+Ref In
5	-Ref In
6	-Tach In
7	+Tach/GND
8	Curr Mon Out
9	Curr Ref Out
10	NC
11	Inhibit
12	+Inhibit
13	-Inhibit
14	Fault Out
15	NC
16	Non Iso GND
17	
18	
19	
20	
21	
22	
23	
24	
25	



Sold & Serviced By:
SERVO2GO.com
Toll Free Phone: 877-378-0240
Toll Free Fax: 877-378-0249
sales@servo2go.com
www.servo2go.com